In re Patent Application of
RAYNOR
Serial No. **Not Yet Assigned**
Filed: **Herewith**
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In the Drawings

Attached are five (5) replacement drawing sheets. The changes made to the drawings are explained in the remarks section below.

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In the Specification:

Please replace paragraph's 5 and 6 on page 2, with the following rewritten paragraph's:

~~The invention is defined in claim 1.~~

~~Preferred features and advantages of the present invention will be apparent from the other claims, and from the following description.~~

In view of the foregoing background, an object of the present invention is to provide a solid state image sensor in which the pixels therein have greater sensitivity than prior art image sensors.

This and other objects, advantages and features in accordance with the present invention are provided by a solid state image sensor comprising a substrate of a first conductivity type, and an epitaxial layer of the first conductivity type on the substrate. An active pixel array is in the epitaxial layer, and each pixel may comprise a first well of a second conductivity type functioning as a collection node, and at least one second well of the first conductivity type adjacent the first well. The at least one second well comprises a plurality of MOS transistors of only the second conductivity type functioning as active elements.

The first conductivity type may comprise a P-type conductivity and the second conductivity type may comprise an N-type conductivity. Alternatively, the first conductivity type may comprise an N-type conductivity, and the second conductivity type may comprise a P-type conductivity.

The solid state image sensor may further comprise circuit elements external the active pixel array. The active elements in each pixel and the external circuit elements may

form part of an analog-to-digital converter. The solid state image sensor may further comprise at least one comparator external the active pixel array, and wherein the active elements in each pixel form an amplifier connected to the at least one comparator for forming part of the analog-to-digital converter. The active elements in each pixel may be selectively switched to the at least one comparator.

The circuit elements external each pixel may comprise at least one current mirror connected to the at least one comparator, and wherein the active elements in each pixel form a differential amplifier for receiving a pixel photodiode voltage and a reference voltage, and for providing a balanced output to the at least one current mirror connected thereto. A latch may be connected to the at least one comparator in which a count is latched by a change of state of the at least one comparator, and a frame store circuit may be connected to the latch for receiving the latched count.

The reference voltage may be ramped during a time when each pixel is integrating a photo induced current, and alternatively, the reference voltage may be ramped during reset of each pixel to provide an offset compensation.

Another aspect of the present invention is directed to a method for forming a solid state image sensor as described above.